On the Nature of Chicxulub Impactor

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The ~200 km diameter Chicxulub crater in the Yucatan carbonate platform in Mexico is currently considered the K/T impact site, responsible for the K/T global ejecta layer. In this work we report results of the studies of the impact breccia sequence cored in the UNAM-5, UNAM-6, UNAM-7 and Yaxcopoil-1 boreholes. UNAM drilling program involved continuous coring of the Tertiary carbonate sequence and the impact lithologies. Yaxcopoil-1 borehole was drilled a year ago as part of the Chicxulub scientific drilling project, in the southern sector of the crater. The Chicxulub deep drilling is part of the International Continental Drilling Program. Coring started at 400 m and was continuous to the final depth of about 1.5 km. We concentrate on the initial studies of the breccia sequence where apparent fragments of meteorite are present and descriptions of the fragments. These findings provide a unique opportunity to investigate on the nature of the Chicxulub impactor, from the study of the impact-related material directly recovered inside the carter.
Identification of impactors forming large terrestrial craters is a difficult problem, mainly because, in contrast to small impacts in which fragments can be preserved, no physical evidence survives the high-energy events. Investigations can be based on analyses of the crater melt rocks and/or melt-rich ejecta. Chemical data on Ni, Cr, Co and PGE contents and interelement ratios have been successfully used in large crater studies. However, fractionation during melting in large impacts, vaporization, condensation, etc can modify chemical composition. Further, subsequent processes of hydrothermal alteration, metamorphism, diagenesis or weathering may alter or erase the chemical signature. Survival of parts of the impacting body in large impacts is restricted by the high temperature/pressures attained and vaporization of impactor. This has been considered the case for the Cretaceous/Tertiary large impact, with siderophile material present into the fine-grained global ejecta layer.